DRAFT CRUISE INSTRUCTIONS
FOCI

R/V *ALPHA HELIX*, FOCI Cruise 1HX04
May 15, 2004 – May 26, 2004
Chief Scientist – Sigrid A. Salo, NOAA/PMEL

1.0 DRAFT CRUISE INSTRUCTIONS

1.1 Cruise Title – Global Ocean Ecosystems Dynamics (GLOBEC) May CTD Survey

1.2 Cruise Numbers

1.2.1 Cruise Number – 285

1.2.2 FOCI Number – 1HX04

1.3 Cruise Dates

1.3.1 Departure – Depart Seward, Alaska, on Saturday, May 15, 2004.

1.3.2 Arrival – Arrive Seward, Alaska, on Monday, May 26, 2004.

1.4 Operating Area – Gulf of Alaska.

2.0 CRUISE OVERVIEW

2.1 Cruise Objectives – This cruise is a Conductivity, Temperature, and Depth (CTD) and Marine Assessment Monitoring and Prediction (MARMAP) Bongo survey. A large eddy is often centered near 48° 30' N, 146° 00' W in May. If it is present and weather allows us to reach it, we plan to spend four to five days surveying the eddy. We will also do CTDs and Bongos at the GLOBEC moorings deployed earlier and occupy CTD transects near Gore Point, over Portlock Bank, and over Stevenson and Chiniak Troughs. We may also recover a mooring with an iron meter, if there was time to deploy it on an earlier cruise.

2.2 Participating Organizations

NOAA – Pacific Marine Environmental Laboratory (PMEL)
7600 Sand Point Way N.E., Seattle, Washington 98115-6439

NOAA – Alaska Fisheries Science Center (AFSC)
7600 Sand Point Way N.E., Seattle, Washington 98115-0070

2.3 Personnel

2.3.1 Chief Scientist

Name	Gender	Affiliation	E-mail Address
Sigrid A. Salo (206) 526-6802	Female	PMEL	Sigrid.A.Salo@noaa.gov

2.3.2 Participating Scientists

Name	Gender	Affiliation	E-mail Address
Sigrid A. Salo	Female	PMEL	Sigrid.A.Salo@noaa.gov
William J. Floering	Male	PMEL	William.Floering@noaa.gov
Elaina M. Jorgensen	Female	AFSC	Elaina.Jorgensen@noaa.gov
David G. Kachel	Male	PMEL	Dave.Kachel@noaa.gov
Dylan Righi	Male	PMEL	Dylan.Righi@noaa.gov

2.4 Administration

2.4.1 Ship Operations

Mr. Thomas Smith, Assistant Director Coastal/Marine Operations
University of Alaska
Seward Marine Center
201 Railway Avenue
P.O. Box 730
Seward, Alaska 99664

Telephone: (907) 224-5261
Fax: (907) 224-3392
E-mail: fnts@uaf.edu
Homepage: http://www.ims.uaf.edu/helix/

2.4.2 Scientific Operations

Dr. Phyllis J. Stabeno, PMEL
Telephone: (206) 526-6453
E-mail: Phyllis.Stabeno@noaa.gov

Dr. Jeffrey M. Napp, AFSC
Telephone: (206) 526-4148
E-mail: Jeff.Napp@noaa.gov

3.0 OPERATIONS

3.1 Responsibilities

3.1.1 Master – The ship's Master shall be in sole command of the vessel and shall be responsible for the welfare of all personnel on board. The Master shall be the final authority in matters relating to the safety, proper navigation, stability, and sailing condition of the vessel and shall execute each voyage with the utmost dispatch.

The Master shall inform the Chief Scientist as soon as possible of any changes in the program necessitated by events. In the case of emergency, nothing in these instructions shall be construed as preventing the Master from taking the most effective action, which, in the Master's judgment, will rectify the situation causing the emergency, and; thereby, safeguard life, property, and the ship.

The Master will have the authority to abort operations temporarily on the basis of clear and present danger to life and property at sea, and will inform the Chief Scientist as soon as safe conditions permit. Full details of the action taken, rationale, and recommendations will be provided at the earliest opportunity. Under normal operating conditions, the Master shall not take any mission-aborting action without consultation with the Chief Scientist.

3.1.2 Chief Scientist – The Chief Scientist is responsible for executing the technical portion of the scientific mission specified by these instructions. Responsibilities also include:

1. Comportment of visiting scientists and technicians,
2. Disposition of data, feedback on data quality, and archiving of data and specimens collected,
3. Administration and physical handling of all scientific party hazardous materials,
4. Assignment of berthing for the scientific party,
5. Cleanliness of all berthing, laboratory, and storage spaces used by the scientific party,
6. Delivery of medical and emergency contact forms for the scientific party, and
7. With the Master, safe, efficient, and economical use of shipboard resources to support the embarked mission.

The Chief Scientist has the authority to revise or alter the technical portion of the instructions as work progresses provided that, after consultation with the Master, it is ascertained that the proposed changes will not:

1. Jeopardize the safety of personnel or the ship,
2. Exceed the overall time allotted for the project,
3. Result in undue additional expenses, or
4. Alter the general intent of these project instructions.

3.1.3 Scheduling – Scheduling of individual activities will depend upon weather conditions and progress of scientific work. Therefore, firm advance scheduling of events will not be possible, and a continual dialogue between scientific and ship's personnel will be important.

3.2 **Data To Be Collected** – We will collect CTD data using the **R/V *ALPHA HELIX***'s CTD. The CTD parameters will include pressure, temperature, salinity, and fluorometer. We will collect nutrient samples at all stations and freeze them for later analysis. We will also collect, filter and freeze chlorophyll samples at selected stations. We will conduct Bongo tows in the eddy and at PMEL GLOBEC mooring sites using the AFSC 60-cm and 20-cm Bongo nets, the Bongo SEACAT, and its deck unit for the Bongo survey. We will also deploy two Advanced Research and Global Observation Satellite (ARGOS) satellite tracked drifters in the eddy if it is present.

3.2.1 **Data Logging** – If the ship has a computer system that operates throughout the cruise acquiring and logging data from navigation, meteorological, and flow-through oceanographic sensors, it is requested that we receive a copy of the data at the end of the cruise. If the navigational data for stations are not recorded on such a system, it is requested that the ship maintain a Marine Observation Abstract (MOA) log provided by the scientists of times, positions, and meteorological conditions for each station.

At regular intervals, not to exceed every five days, the ship's computer manager will archive data from disk files to recordable compact diskettes (CD-R) for delivery to the Chief Scientist at the end of the cruise. Additional recording of processed data may be requested of the ship's computer manager. The ship's computer manager will ensure data quality. During the cruise, the scientific party may require the assistance of the ship's computer manager to determine if all sensors are functioning properly and to monitor some of the collected data in real time to make sampling strategy decisions

3.2.2 **Marine Observation Abstract (MOA)** – If the navigational data for stations are not recorded on the ship's data logger, it is requested that the ship maintain a MOA form during the cruise. The critical information to be recorded at each station is:

- Coordinated Universal Time (UTC) date,
- UTC time,
- Position,
- Station number,
- Haul number,
- Gear type, and
- Bottom depth.

3.3 **Staging Plan** – The Bongo nets, sample jars and preservatives, Bongo SEACAT and SEACAT deck unit will be shipped to the Seward Marine Center, where the **R/V *ALPHA HELIX*** is docked, in time for the cruise. If vans are available in Anchorage, Alaska, for one-way rentals to Seward, Alaska, in May, the scientific party will arrive in a van and use the van as necessary in Seward, Alaska.

3.4 **De-staging Plan** – After the cruise, the scientific party will arrange to have the nets, samples, SEACAT and deck unit, and un-used preservatives stored at the Seward Marine Center for a GLOBEC cruise later in the summer or picked up from the Seward Marine Center to be transported back to Seattle, Washington. If possible, we will rent a van for the return to Anchorage, Alaska. Otherwise, there is a bus that goes from Seward, Alaska, to the Anchorage, Alaska, airport once a day.

3.5 **Cruise Plan** – The order of operations and the amount of work we can accomplish will depend on the weather. We want to complete a CTD/Bongo survey of a large offshore eddy, which is often centered near 57° 30' N, 146° 00' W in mid-spring (see Section 8.2.1 Eddy Location in 2003 for last year's eddy location). This will be the most challenging operation of the cruise because of the distance from shore. If the eddy does not form this year, or is too far to reach, we will emphasize the other transects in our list and provide other as-yet undetermined plans.

Before the cruise, we will determine the position of the eddy from satellite altimetry and from Sea-Viewing Wide Field-of-view Sensor (SeaWiFS) or MODerate-resolution Imaging Spectroradiometer (MODIS) chlorophyll images if they are available. We will obtain updates from the ship's satellite link or from shore during the cruise. An earlier PMEL cruise may also have time to place a satellite-tracked drifter in the eddy, which would help track it.

Weather permitting, we will begin the cruise by completing two transects passing through the core of the eddy. If the eddy is right near the shelf-break, one transect will be perpendicular to local bathymetry and the other will be parallel to local bathymetry. Otherwise, the transects will be North-South and East-West. CTD spacing will be ten kilometers except over the shelf-break, where the spacing will be five kilometers. CTD casts will go to 10 meters off the bottom in shallow water and to 1,500 meters, or deeper, when possible, in deeper water. Bongos will go to 100 meters. We will deploy two drifters near the core of the eddy during the first transect, and if time allows, we will verify whether we have actually found the center of the eddy by taking four more CTDS each five kilometers from the supposed center and 400 meters deep.

The other goals of the cruise are CTD surveys near Gore Point and just east of the point, over Portlock Bank, Stevenson Trough, and Chiniak Trough. Additionally, calibration CTD casts will be conducted near the PMEL GLOBEC moorings. CTD casts will go to 10 meters off the bottom. We will do one Bongo near a mooring, which contains a plankton sampler.

3.6 **Station Locations** – A list of possible CTD/Bongo positions is provided in Section 8.2.3 Cruise 1HX04 Station Locations. Note that the position of the eddy and moorings are from last year's cruise; however, the mooring positions will probably be similar this year, but the eddy positions will not be. Section 8.2.2 Cruise 1HX04 Chartlet shows the positions of CTD casts taken in the eddy in May 2003, along with the known CTD positions for this year. We may not be able to reach all the positions in the list in Section 8.2.3 Cruise 1HX04 Station Locations if we are able to find and survey the eddy.

3.7 **Station Operations** – The following are operations to be conducted on this cruise:

3.7.1 **CTD/Water Sample Operations** – A Sea-Bird Electronics' SBE 911*plus* Conductivity, Temperature, and Depth (CTD) profiler with dual thermistors and conductivity cells will be the primary system. The primary system will be provided and maintained by Pacific Marine Environmental Laboratory (PMEL). A backup SBE 911*plus* CTD is required and will be provided by the vessel. When available, and where possible, FOCI's fluorometer and light meter should be mounted on the CTD stand for all casts; however, these instruments cannot exceed the following depths:

- WET Labs' WETStar fluorometer cannot exceed 600 meters,
- Biospherical Instruments'QSP-200L4S light meter cannot exceed 1,000 meters, and
- FOCI's Sea-Bird Electronics SBE 911*plus* CTD cannot exceed 3,000 meters.

On selected casts, water samples will be collected. Water for microzooplankton samples will be collected using 10-liter Niskin bottles; however, when only nutrient or chlorophyll water samples are required, smaller Niskin bottles may be used.

Once the CTD has been deployed, it should be lowered to 10 meters, and then the deck unit should be turned on. After one minute when the pumps have turned on, the CTD can be returned to just below the surface. If the bottom of the CTD breaks the surface of the water, then we will need the CTD to be lowered to 10 meters again for approximately one minute. Then the data acquisition program and Video Home System (VHS) CTD tape backup system should be started. The CTD should descend at a rate of 30 meters per minute for the first 200 meters and 40-45 meters per minute below that. The ascent rate should be 40-45 meters per minute. One exception to the descent rates occurs on the Bering Shelf in water less than 150 meters. In this case, the CTD should descend at 10-20 meters per minute during the entire cast. An entry in the Electronic Marine Observation Abstract (E-MOA) should be made for each CTD cast at the maximum cast depth.

CTD data will be acquired on a PMEL provided computer using SBE's SEASOFT application. Survey technicians and scientists will keep the ***CTD Cast Information/Rosette Log***. Pressure, primary salinity, secondary salinity, primary temperature, secondary temperature, fluorescence, and light levels will be recorded on the ***CTD Cast Information/Rosette Log*** for all water bottle samples.

3.7.1.1 **CTD Calibration** – Salinity samples will be taken on every cast, or as specified by the Chief Scientist. No reversing thermometers will be required. The CTD systems will be equipped with dual thermistors. If requested, a Survey Technician will run Autosal salinometer analyses during the cruise and record the readings on an Autosal log.

3.7.2 **MARMAP Bongo Tows** – A 60-cm aluminum Bongo frame with 0.505-mm mesh nets (or 0.333-mm before mid-May), hard plastic cod-ends, and a 40-kg lead weight for a depressor will be used in standard Marine Assessment Monitoring and Prediction (MARMAP) Bongo tows. The nets will be deployed at a constant wire speed of 40-45 meters per minute to a maximum depth of 100 meters (or 200 meters before mid-May), or 5-10 meters off bottom in shallower waters. However, at stations on Lines 8, 16, and 17 in Shelikof Strait and for egg collections, nets will be towed from 10 meters off bottom to the surface. In addition, one side of the 60-cm bongo will be changed to 0.333-mm mesh net. Furthermore, the 20-cm bongo with 0.150-mm mesh nets will be attached to the wire one meter above the 60-cm bongo frame at Line 8 and at selected other stations.

The winch should be one of the ship's oceanographic winches equipped with slip rings and at least 2,000 meters of 0.322, 2-layer, 3-conductor oceanographic wire. A Sea-Bird Electronics SBE 19 SEACAT Profiler or SBE 39 Temperature and Pressure Recorder will be attached to the wire above the bongo frame(s) to provide real-time

tow data. The Pacific Marine Environmental Laboratory (PMEL) will provide the primary SEACAT or SBE 39, and the ship will provide the backup SEACAT. Before the SEACAT is terminated on the wire by the ship's electronic technician and the survey technician, a PMEL scientist will note the identification number of the unit and provide the proper calibration file for the computer when the SEACAT from PMEL is used; however, if the ship's equipment is used, current calibrations should be available. Personnel from PMEL will provide the acquisition computer and monitor. There is no requirement for the SEACAT data to be displayed on the Scientific Computer System (SCS).

After the bridge gives permission, the marine technician and one or two scientists will deploy and recover the bongo array. A scientist will be stationed in the ship's DataPlot compartment to monitor the SEACAT and to inform the ship's survey technician and winch operator when the desired gear depth is reached. The bridge will then be instructed either by the scientist in DataPlot or by the survey technician to enter the position in the Electronic Marine Observation Abstract (E-MOA). Afterwards, the winch operator is instructed from DataPlot to retrieve the nets at a wire speed of 20 meters per minute. The ship's speed should be adjusted to maintain a wire angle of 45° during the entire tow, which is accomplished by the survey technician relaying wire angles to the bridge by radio. When the nets reach the surface, they are brought aboard and hosed with saltwater to wash the sample into the cod-end. The sample is preserved as specified in the ***FOCI Field Manual*** or sample collection request forms. In some cases, larvae are sorted and preserved separately. Flow meters in the nets record the amount of water filtered, and the SBE 19 SEACAT, or SBE 39, records the depth history of the tow. The scientists on watch are responsible for recording times, maximum depth, wire outs, and flow meter counts on the Cruise Operations Database (COD) forms. Tows not meeting specifications (i.e., hit bottom, poor wire angles, nets tangled, etc.) may be repeated at the discretion of the scientific watch.

3.7.3 **Chlorophyll Sampling Operations** – Chlorophyll samples will be collected from the 10-liter Niskin bottles filled during Conductivity, Temperature, and Depth (CTD) profiler casts. The scientists will be responsible for collection, filtration, and preservation of samples. Sampling depths depend on the fluorescence or chlorophyll absorbance meter (ChlAM) profile. A typical strategy would be samples at 0, 10, 20, 30, 40, and 50 or 60 meters, depending upon which of the latter two depths is closest to the fluorescence or chlorophyll maximum. If the maximum is deeper than 60 meters, sampling should be moved deeper with fewer samples in the mixed layer.

When microzooplankton samples are to be collected from the same Niskin bottle, 500 milliliters of water is first removed from the water bottle using a graduated cylinder. Chlorophyll and nutrient samples are obtained from the collected 500 milliliters in the graduated cylinder. See the ***FOCI Field Manual*** for sampling collection, filtration, and preserving details. The -70° Celsius freezer is required for sample storage.

3.7.4 **ARGOS Satellite-Tracked Drifter Buoy Deployments** – Two to three working days before deployment, the Chief Scientist, or designee, will secure the drifter on the back deck. The drifter buoy is then turned on, usually by removing the magnet, and an e-mail message will be sent by the Chief Scientist, or designee, to Dr. Phyllis Stabeno at Phyllis.Stabeno@noaa.gov, stating the serial number that is stamped on the drifter and the time that it was turned on. This lead-time is necessary to ensure that telemetry

from the buoy is being received and transmitted by the Advanced Research and Global Observation Satellite (ARGOS). The method of deployment of the drifter is dependent upon the particular make of drifter and is to be directed by the Chief Scientist, or designee.

3.8 Underway Operations – The following are underway operations to be conducted on this cruise:

3.8.1 Acoustic Doppler Current Profiler (ADCP) Operations

3.8.1.1 ADCP Observations – The purpose of the 150-KHz vessel mounted ADCP is to measure the ocean current velocity continuously over the upper 300 meters of the water column, usually in 8-meter depth increments. Current velocities relative to the earth at this spatial and temporal resolution cannot be measured by other methods: CTD sections, current-meter moorings, or drifting buoys. Additionally, ADCP data are used to estimate the abundance and distribution of biological scatterers over the same depth range and in the same depth increments.

3.8.1.2 ADCP Data Collection – ADCP measurement requires four instruments working in concert:

- The ADCP,
- The ship's gyrocompass,
- A Global Positioning System (GPS) receiver, and
- A GPS Attitude Determination Unit (ADU).

The ADCP is connected to a dedicated Personal Computer (PC) and controlled by RD Instruments' (RDI) Data Acquisition System (DAS) version 2.48 software. DAS shall be configured to use the user-exit programs *AGCAVE.COM* and *UE4.EXE*. **Separate written instructions detailing the ADCP setup and configuration files are kept in the large, black ADCP notebook in a filing cabinet drawer of the ship's DataPlot compartment.**

The ADCP PC is interfaced to the ship's gyrocompass, primary scientific GPS receiver, and ADU. The navigation GPS receiver shall be configured to send NMEA-0183 $GPGGA and $GPVTG sentence sets to the PC's COM2 serial port at the maximum fix update rate for that receiver (usually a 1- or 2-second rate) and with the maximum number of decimal places for position precision (optimally 4). The ADU shall be configured to send the NMEA-0183 $PASHR sentence set to the PC's COM1 serial port once per second. The user-exit program *UE4.EXE* shall be configured to control acquisition and processing of GPS and ADU sentence sets, and to synchronize the PC clock with the time reported by the primary GPS receiver.

The ADCP PC logs data from the profiler to Iomega Zip disks. No more than one Iomega Zip disk will be required for each cruise. At the end of the cruise, a backup of the Iomega Zip disk should be made to a unique subdirectory on another disk, maintained by the ship for this purpose, until the original data are certified at PMEL.

3.8.1.3 **Data Logging** – Detailed post-cruise processing of ADCP data can take advantage of a larger quantity of navigation data than is retained by the ADCP acquisition software. Thus, the ship's data logger is relied on to log GPS and ADU navigation data at high rates.

ADCP analysis requires the input from navigation, heading, and ADCP electronics box sensors on **R/V *ALPHA HELIX*.** SCS parent sensors, only, need be logged; SCS child sensor logging is not required for ADCP analysis. The required SCS parent sensors and logging rates are as follows:

SCS Sensor	Logging Rate (sec)
Trimble P-code GPS $GPGGA	1
Trimble P-code GPS $GPVTG	1
Northstar DGPS $GPGGA	10
Northstar DGPS $GPVTG	10
Ship's Gyrocompass $HEHDT	10
Raw RDI box temperature	60
Raw RDI box voltage	60
POS/MV $PASHR	10
MX-412 DGPS $GPGGA	10
MX-412 DGPS $GPVTG	10

For ADCP analysis, no other SCS sensors need be logged, but other users may have their own SCS logging needs. If those conflict with the ADCP needs for the above sensors, then SCS should be configured to record these at the fastest logging rate required by all users.

In the above table it is assumed that for ADCP purposes, the primary position sensor is the Trimble P-code GPS receiver, and that the Northstar and Leica MX-412 DGPS receivers are secondary. If the primary GPS receiver should malfunction during a cruise, then the Northstar should be made the primary ADCP navigation device. This is accomplished by connecting the Northstar to the ADCP's COM2 serial port, and setting SCS to record the Northstar's $GPGGA and $GPVTG sentence sets at 1-second rates. If the Northstar also fails, then the Leica MX-412 would be made the primary sensor in an analogous manner. Changes in the availability of GPS equipment shall be communicated to Pacific Marine Environmental Laboratory (PMEL) to allow the above list to remain current. It is the responsibility of the ship to install and enable the appropriate encryption key for use in the P-code receiver should GPS Selective Availability be turned on again by the Department of Defense (DoD).

3.8.1.4 **ADCP Underway Operations** – The ADCP operates continuously during the entire cruise. At the start of a cruise, the system shall be configured and started according to the provided checklists ***Before Leaving Port*** and ***Underway to Operations Area***. The ADCP and its interface to the gyro and navigation must be checked daily by completing the ***ADCP Daily Log*** and at the end of the cruise with the ship tied to the pier.

In case of problems, please describe the problem, error message numbers, flashing lights, etc., on the log sheets. Also, contact Dr. Edward D. Cokelet at PMEL by telephone, (206) 526-6820, or by e-mail, Edward.D.Cokelet@noaa.gov, as soon as possible.

3.8.1.5 **ADCP Configurations** – Several ADCP DAS configuration (.CNF) files are provided in the *C:\ADCP248* directory on the ADCP PC. For system checkout before acquiring current data, use *CHECK02.CNF* or *CHECK02X.CNF*. (The X-suffix is appended to all configurations that enable the ADCP to be controlled by an external trigger pulse as required when the ADCP is used in conjunction with an Alaska Fisheries Science Center (AFSC) hydroacoustics fish-stock-assessment echo sounder such as the SIMRAD EK500 Scientific Echosounder. External triggering makes the ADCP and the echo sounder ping and listen in concert, reducing interference.) For ADCP current measurements, use *02WBT.CNF* (or *02WBTX.CNF*) when the water depth is less than 500 meters for over two hours. WBT stands for With Bottom Track, which means the ADCP alternately measures the water and sea-bottom velocities and produces the best accuracy. If working in water depths greater than 500 m for more than 2 hours, use *02NBT.CNF* (or *02NBTX.CNF*) where NBT stands for No Bottom Track. This suspends bottom searching and concentrates all pings in the water for the best reduction in variance.

3.8.1.6 **Data Dispensation** – At the end of each cruise, a copy of the ADCP ping data logged by the ADCP's PC and the SCS files for the **above sensors only** should be sent to:

Dr. Edward D. Cokelet
NOAA/PMEL
7600 Sand Point Way N.E.
Seattle, Washington 98115

Telephone: (206) 526-6820
E-mail: Edward.D.Cokelet@noaa.gov

3.8.1.7 **Dedicated ADCP Transects** – One or more dedicated ADCP transects may be requested during a cruise. Each should be run at constant heading (not constant course-over-ground) if practical, thus minimizing gyrocompass lag. However, transects along lines of current-meter moorings should remain on the line with the ship's heading gradually adjusted to accomplish this. Sharp turns should be avoided and the ship's speed should be constant. A speed of twelve knots is often satisfactory, but the ship may have to slow down if the ADCP's "percent good pings" decreases below 75% in the upper 200-250 meters due to sea state.

3.8.1.8 **ADCP Backtrack-L Calibration** – Occasionally, the ship may be requested to execute a backtrack-L calibration maneuver to test the instruments and to calibrate the transducer misalignment angle for which a 0.5° error can seriously bias the measurements. The "misalignment angle" may change with the ship's trim as well as with remounting the ADCP transducers. The basic idea is to measure the current twice on closely spaced parallel tracks of opposite heading when the ADCP and GPS are working well. The maneuver consists of four legs (north, south, east and west headings) connected by simple U-turns forming an L shape. Each leg should be 30 minutes long; the first 10 minutes are to allow the ship and instruments to stabilize on the new heading. The entire calibration should require about 2 1/2 hours with 5 minutes allowed for each turn. The following should be considered:

1. Negligible currents are best; however, stronger currents are acceptable as long as they are reasonably uniform and steady. Avoid regions of strong horizontal shear due to topography, flow through passes, eddies, and current boundaries. In tidal currents, calibrate when the current is steadiest, often at maximum flood and ebb rather than at slack water.
2. Calibration legs can be done in any order provided opposite-headed legs are sequential.
3. Opposite-headed legs should be parallel and closely spaced, but not retraced. Use U-turns to minimize gyrocompass oscillations. Avoid Williamson and hairpin turns.
4. The ADCP's PC screen should show at least 75%-good pings down to 250 meters.
5. The ship should go fast enough to detect a misalignment error (over five knots), but slow enough to satisfy condition 4. This depends on sea conditions; however, ten to twelve knots is often satisfactory.
6. Choose a time when GPS is navigating and is expected to remain so over the next two hours.

3.8.1.9 **ADCP Absolute Backscatter Calibration** – A test to calibrate the absolute backscatter strength and to determine the background noise level of the ship's ADCP system may be performed once per cruise at the discretion of the Chief Scientist. Specific instructions in such event will be provided by PMEL personnel aboard, and cannot be anticipated in advance of the cruise. Typically, such a test will be attempted in conditions when weather is relatively calm and the water depth exceeds 250 meters. This test may require that the main power plant, pumps, sonars, and other sources of acoustic and electronic noise be shut down. If conducted in the course of normal operations, the work will require about one hour. There may be opportunities for variations of the test at other times when the ship is at anchor, requiring the cooperation of the ship's officers and engineering watch.

3.8.2 **Scientific Computer System** – The ship's Scientific Computer System (SCS) shall operate throughout the cruise, acquiring, and logging data from navigation, meteorological, oceanographic, and fisheries sensors. The SCS data acquisition node will provide project scientists with the capability of monitoring sensor acquisition via text and graphic displays. A data processing node will be available to project scientists throughout the cruise, configured according to the specifications of the FOCI SCS administrators. In addition, scientists will provide any calibration information applicable for their instruments connected to the ship's SCS

4.0 FACILITIES

4.1 Equipment and Capabilities Provided by Ship

- Oceanographic winch with slip rings and 3-conductor cable terminated for CTD,
- Oceanographic winch with slip rings and 3-conductor cable terminated for the SBE SEACAT, for net tow operations,
- Sea-Bird Electronics' SBE 911*plus* CTD system with stand, each CTD system should include underwater CTD and weights. There should be one deck unit for the two systems,
- 5-liter Niskin sampling bottles for use with rosette,
- Conductivity and temperature sensor package to provide dual sensors on the CTD (primary),
- Meter block for plankton tows,
- Wire speed indicators and readout for winches,
- For meteorological observations: anemometer, calibrated air thermometer (wet-and dry-bulb) and a calibrated barometer and/or barograph,
- Freezer space for storage of biological and chemical samples,
- Echosounder,
- RD Instruments' ADCP,
- Data logger,
- Laboratory space with exhaust hood, sink, lab tables and storage space,
- Sea-water hoses and nozzles to wash nets (quarterdeck and aft deck),
- Adequate deck lighting for night-time operations,
- Navigational equipment including GPS and radar, and
- Ship's crane(s) used for loading and/or deploying.

4.2 Equipment and Capabilities Provided by Scientists

- Sea-Bird Electronics' SBE-19 SEACAT system,
- 60-cm Bongo sampling arrays,
- 20 cm Bongo arrays,
- Wire angle indicator for Bongo,
- ARGOS tracked drifter buoys, and
- Miscellaneous scientific sampling and processing equipment.

4.3 **Pre-cruise Meeting** – A pre-cruise meeting between the ship's representative and the Chief Scientist will be held before the start of the cruise. Its purpose is to identify the day-to-day requirements of the project in order to best utilize shipboard personnel resources and to

identify overtime requirements. A brief meeting of all scientific personnel, the ship's officers, deck and marine tech departments, and other relevant ship's personnel should be held before the vessel reaches the operations area for the purposes of:

1. Introducing scientific personnel to ship's procedures, proper channels, etc.,
2. Discuss operating procedures for deploying various pieces of sampling equipment, and
3. Coordinating scientific watch assignments.

5.0 DISPOSITION OF DATA AND REPORTS

5.1 **Data Responsibilities** – The Chief Scientist is responsible for the disposition, feedback on data quality, and archiving of data and specimens collected on board the ship for the primary project. The Chief Scientist will be considered the representative of the Directors of PMEL and AFSC for purpose of data disposition. A single copy of all data gathered by the vessel shall be delivered to the Chief Scientist upon request for forwarding to the FOCI Coordinator, acting as representative for the Laboratory Directors. The FOCI Coordinator will be responsible for data archival and distribution of data to other investigators desiring copies.

5.2 **Electronic Marine Observation Abstract (E-MOA)** – The ship is requested to maintain an E-MOA form using the Scientific Computer System's Event Logger during the cruise. The critical information recorded at each station is:

- Coordinated Universal Time (UTC) date,
- UTC time,
- Position,
- Station number,
- Haul number,
- Gear type, and
- Bottom depth.

5.3 **Electronic Navigation Plot** – The ship will use the electronic navigation suite's file system to maintain the position of each operation and station. If requested, a diskette of the export file will be given to the Chief Scientist.

5.4 **Navigation** – Observations and reliable fixes shall be plotted and identified by date/time group, or equivalent by ship's officers. Fixes shall be evaluated for course and/or speed made good. Global Positioning Satellite (GPS), radar range and bearing, and/or visual fixes shall provide primary navigational control.

5.5 **Cruise Data Package** – The following data products will be included in the cruise data package:

- Marine Operations logs,
- Data logger files of weather, position, depth, and seachest variables,
- Calibration Sheets for all ship's instruments used,
- CTD Weather Observation Log, and
- ADCP compact diskette.

6.0 HAZARDOUS MATERIALS

6.1 Definition – Hazardous scientific materials are any substance, which because of its chemical properties can cause the deterioration of the materials or injury to living organisms. Rules for the stowage, labeling, and protection of flammables and other hazardous scientific stores on inspected vessels are given in ***Subchapter U, Title 46 CFR, Part 194***.

6.2 Standards

6.2.1 Storage Containers – Storage containers should be marked, labeled, and stored in a ventilated and protected area under the supervision of the Chief Scientist with the knowledge and approval of the Master. Consideration should be given to transporting and storing hazardous materials, normally shipped in glass containers, in special, non-breakable containers.

6.2.2 Working Quantities – Working quantities only should be stored in the laboratory. A reasonable working quantity would be a one-day supply, considering the hazard posed by the material. Containers should be marked with the material's chemical and common names, type, and classification.

6.2.3 Storerooms – Storerooms for chemicals and flammables, where practicable, should be protected by fixed CO_2 or Halon systems, and used for no other purpose. Where it is not practical to provide such a storeroom, consideration should be given to a hazardous material locker appropriate for the type and quantity of material being stored.

6.2.4 Incompatible Materials – Because of the limited shipboard storage for hazardous materials, particular attention must be made to avoid storing incompatible materials together. A close review of the Material Safety Data Sheets (MSDS) will show if two chemicals are incompatible.

6.3 Transportation and Disposal – The Chief Scientist is responsible for the proper transportation, shipping, and disposal of hazardous materials, including empty containers, associated with their project. Transportation and disposal must be carried out in accordance with Federal, State, and Local regulations. In no case will this responsibility be passed to the ship's crew or operating institution unless specifically arranged in advance.

6.4 Chemical Spill Response – The scientific party is responsible for supplying neutralizing agents, buffers, and/or absorbents in the amounts adequate to address spills of a size equal to the amount of any chemicals brought aboard. This spill response material must accompany the chemicals when they come aboard.

6.5 Inventory List – See Section 8.2.4 Cruise 1HX04 HAZMAT Inventory.

6.6 Material Data Safety Sheets (MSDS) – Submitted separately as electronic attachments when available.

7.0 COMMUNICATIONS – For scientific projects, the Chief Scientist, or their designated representative, may have access to the ship's communications systems on a cost reimbursable basis.

7.1 Satellite Communications – INMARSAT (voice and facsimile) communications are available aboard ship and may be used for personal or business related calls. Arrangements to pay for the calls must be made before calling. Credit card calls are the preferred method of payment. INMARSAT calls can be extremely expensive and the exact cost may not be known until you receive your bill.

7.2 Electronic Mail (E-mail) – FOCI requests that **R/V *ALPHA HELIX*** transmit e-mail at least twice a day. Each embarked personnel will have an e-mail account and address established in their name by the ship.

7.3 Receiving Scientific Status Reports – The Chief Scientist may anticipate the need for daily reports on the position of satellite drifters in the study area and on the status of biophysical mooring(s). These will be sent either by facsimile from PMEL over INMARSAT, IRIDIUM phone (PMEL provided), or over the Internet via e-mail from PMEL.

7.4 Use of Radio Transceivers – Because it is sometimes necessary for the scientific staff to communicate with other research vessels, commercial vessels, and shore based NOAA facilities, the Chief Scientist or designee may request the use of radio transceivers aboard the vessel.

7.5 Important Telephone and Facsimile Numbers and E-mail Addresses

7.5.1 Pacific Marine Environmental Laboratory (PMEL)

FOCI – Ocean Environmental Research Division (OERD2):
- (206) 526-4700 (voice)
- (206) 526-6485 (fax)

Administration:
- (206) 526-6810 (voice)
- (206) 526-6815 (fax)

E-Mail: FirstName.LastName@noaa.gov

7.5.2 Alaska Fisheries Science Center (AFSC)

FOCI – Resource Assessment and Conservation Engineering (RACE):
- (206) 526-4171 (voice)
- (206) 526-6723 (fax)

E-Mail: FirstName.LastName@noaa.gov

7.5.3 R/V *ALPHA HELIX*

INMARSAT B:

- 011-872-336-862-510 (voice)
- 011-872-336-862-512(fax)

IRIDIUM Telephone

- 011-881-631-461-963

7.5.4 University of Alaska – Seaward Marine Center

7.5.4.1 Assistant Director Coastal/Marine Operations – Mr. Thomas Smith,

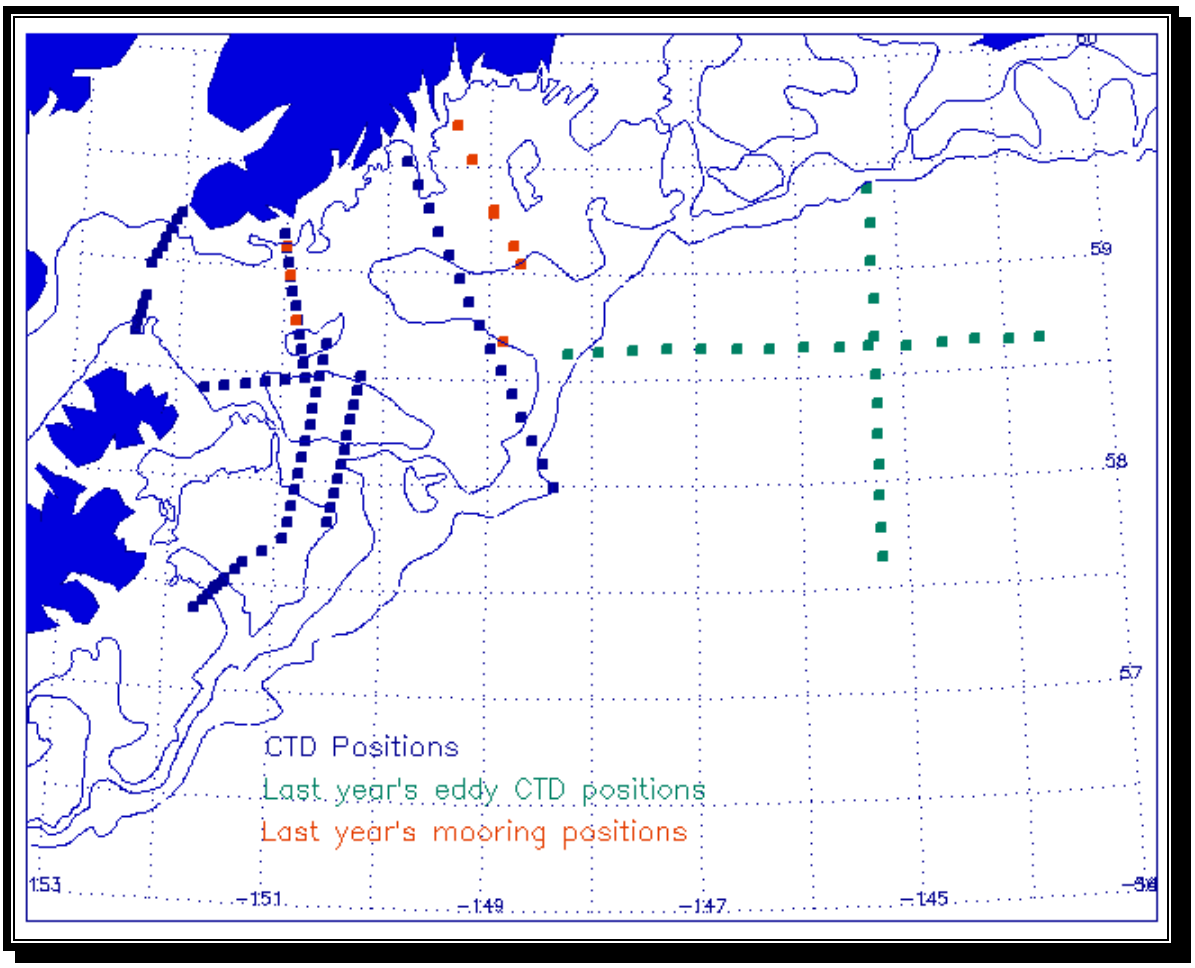
- (907) 224-5261 (voice)
- (907) 224-3392 (fax)
- fnts@uaf.edu

8.0 APPENDICES

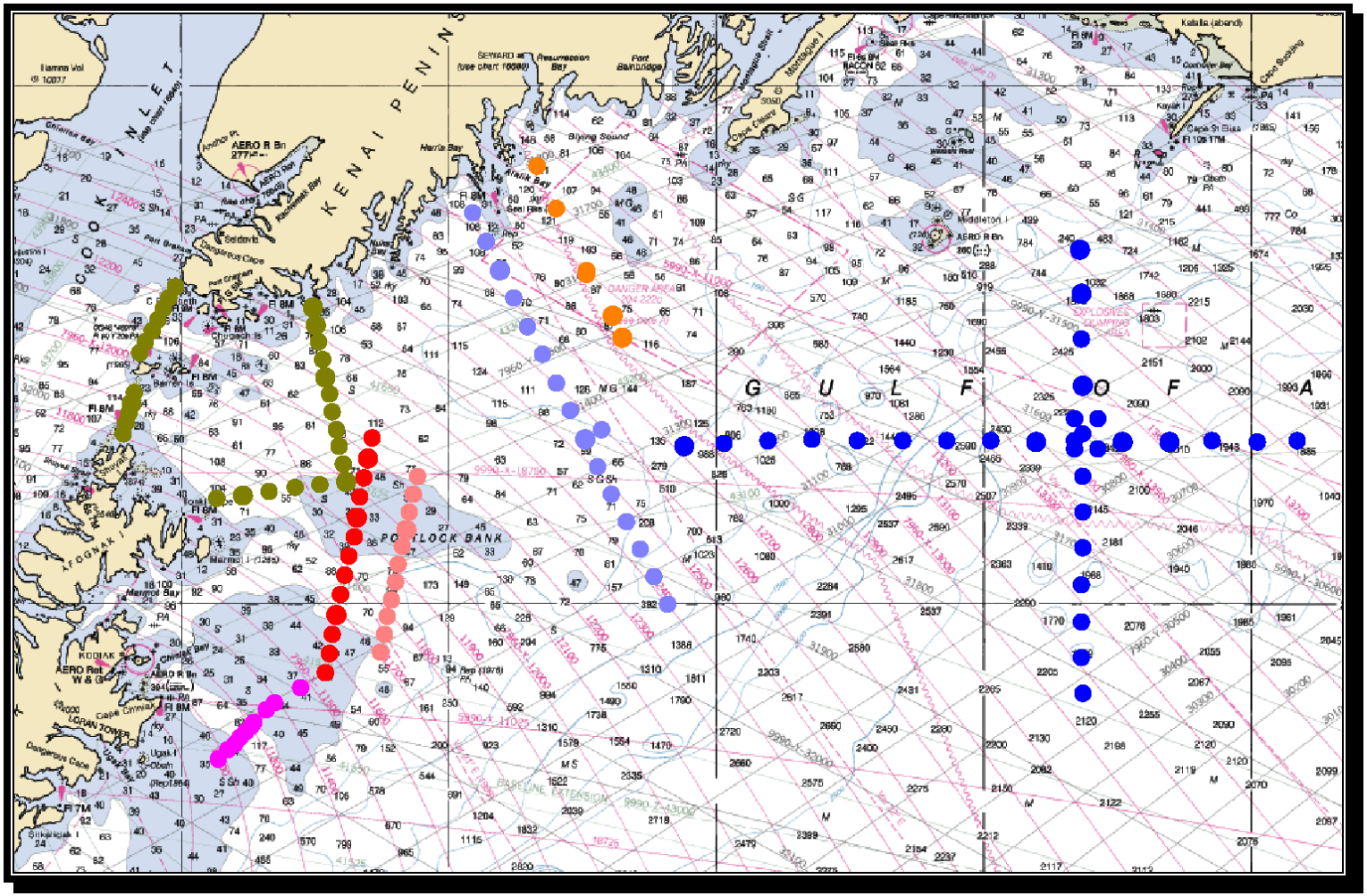
8.1 **Cruise 1HX04 Equipment Inventory** – A complete equipment inventory will be provided in the Final Cruise Instructions.

8.2 **Cruise 1HX04 Figures**

8.2.1 Eddy Location in 2003



8.2.2 Cruise 1HX04 Chartlet



8.2.3 Cruise 1HX04 Station Locations

Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Trans (hrs)	Depth (m)	On Sta (hrs)	Arrive (Local) Date/Time	Depart Date/Time
Depart Seward, AK	60° 10.00' N	149° 30.00' W							05/15/2004 09:00
K2 line	59° 31.10' N	149° 49.00' W	40.1	10	4.0	210	0.3	05/15/2004 13:00	05/15/2004 13:18
	59° 24.58' N	149° 42.72' W	7.3	10	0.7	205	0.3	05/15/2004 14:00	05/15/2004 14:18
	59° 18.05' N	149° 36.45' W	7.3	10	0.7	155	0.3	05/15/2004 15:00	05/15/2004 15:18
	59° 11.53' N	149° 30.18' W	7.3	10	0.7	145	0.3	05/15/2004 16:00	05/15/2004 16:18
	59° 05.00' N	149° 23.90' W	7.3	10	0.7	160	0.3	05/15/2004 17:00	05/15/2004 17:18
	58° 58.48' N	149° 17.62' W	7.3	10	0.7	210	0.3	05/15/2004 18:00	05/15/2004 18:18
	58° 51.95' N	149° 11.35' W	7.3	10	0.7	215	0.3	05/15/2004 19:00	05/15/2004 19:18
	58° 45.42' N	149° 05.08' W	7.3	10	0.7	210	0.3	05/15/2004 20:00	05/15/2004 20:18
	58° 41.02' N	148° 50.86' W	8.6	10	0.9	210	0.3	05/15/2004 21:12	05/15/2004 21:30
	58° 38.92' N	148° 58.08' W	4.3	10	0.4	150	0.0	05/15/2004 21:54	05/15/2004 21:54
	58° 32.38' N	148° 52.52' W	7.2	10	0.7	120	0.3	05/15/2004 22:36	05/15/2004 22:54
	58° 25.85' N	148° 46.25' W	7.3	10	0.7	130	0.3	05/15/2004 23:36	05/15/2004 23:54
	58° 19.33' N	148° 39.98' W	7.3	10	0.7	200	0.3	05/16/2004 00:36	05/16/2004 00:54
	58° 12.80' N	148° 33.70' W	7.3	10	0.7	500	0.5	05/16/2004 01:36	05/16/2004 02:06
	58° 06.28' N	148° 27.42' W	7.3	10	0.7	1200	1.0	05/16/2004 02:48	05/16/2004 03:48
	57° 59.75' N	148° 21.15' W	7.3	10	0.7	1200	1.0	05/16/2004 04:30	05/16/2004 05:30
Eddy Study (W to E)	58° 37.27' N	148° 13.60' W	37.7	10	3.8	3000	1.5	05/16/2004 09:18	05/16/2004 10:48
	58° 37.74' N	147° 56.04' W	9.2	10	0.9	3000	1.5	05/16/2004 11:42	05/16/2004 13:12
	58° 38.55' N	147° 36.09' W	10.4	10	1.0	3000	1.5	05/16/2004 14:12	05/16/2004 15:42
	58° 38.65' N	147° 16.42' W	10.2	10	1.0	3000	1.5	05/16/2004 16:42	05/16/2004 18:12
	58° 38.46' N	146° 55.86' W	10.7	10	1.1	3000	1.5	05/16/2004 19:18	05/16/2004 20:48
	58° 38.49' N	146° 35.63' W	10.5	10	1.1	3000	2.2	05/16/2004 21:54	05/17/2004 00:06
	58° 38.46' N	146° 16.08' W	10.2	10	1.0	3000	1.5	05/17/2004 01:06	05/17/2004 02:36
	58° 38.41' N	145° 56.36' W	10.3	10	1.0	3000	1.5	05/17/2004 03:36	05/17/2004 05:06
	58° 38.24' N	145° 36.04' W	10.6	10	1.1	3000	1.5	05/17/2004 06:12	05/17/2004 07:42
Argos drifter	58° 38.24' N	145° 36.04' W	0.0	10	0.0			05/17/2004 07:42	05/17/2004 07:42
	58° 38.35' N	145° 18.46' W	9.1	10	0.9	3000	2.2	05/17/2004 08:36	05/17/2004 10:48
	58° 38.25' N	144° 57.33' W	11.0	10	1.1	3000	1.5	05/17/2004 11:54	05/17/2004 13:24
Argos drifter	58° 38.25' N	144° 57.33' W	0.0	10	0.0			05/17/2004 13:24	05/17/2004 13:24

Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Trans (hrs)	Depth (m)	On Sta (hrs)	Arrive (Local) Date/Time	Depart Date/Time
	58° 38.25' N	144° 36.44' W	10.9	10	1.1	3000	1.5	05/17/2004 14:30	05/17/2004 16:00
	58° 38.55' N	144° 17.31' W	10.0	10	1.0	3000	1.5	05/17/2004 17:00	05/17/2004 18:30
	58° 38.21' N	143° 56.97' W	10.6	10	1.1	3000	2.2	05/17/2004 19:36	05/17/2004 21:48
	58° 38.34' N	143° 38.95' W	9.4	10	0.9	3000	1.5	05/17/2004 22:42	05/18/2004 00:12
Eddy Study (N to S)	59° 22.73' N	145° 16.22' W	66.9	10	6.7	1200	1.7	05/18/2004 06:54	05/18/2004 08:36
	59° 12.65' N	145° 15.62' W	10.1	10	1.0	3000	1.5	05/18/2004 09:36	05/18/2004 11:06
	59° 01.98' N	145° 15.47' W	10.7	10	1.1	3000	1.5	05/18/2004 12:12	05/18/2004 13:42
	58° 51.44' N	145° 15.16' W	10.5	10	1.1	3000	1.5	05/18/2004 14:48	05/18/2004 16:18
	58° 43.52' N	145° 08.51' W	8.6	10	0.9	400	0.5	05/18/2004 17:12	05/18/2004 17:42
	58° 43.52' N	145° 18.91' W	5.4	10	0.5	400	0.5	05/18/2004 18:12	05/18/2004 18:42
	58° 40.02' N	145° 15.21' W	4.0	10	0.4	3000	2.2	05/18/2004 19:06	05/18/2004 21:18
	58° 36.52' N	145° 08.51' W	4.9	10	0.5	400	0.5	05/18/2004 21:48	05/18/2004 22:18
	58° 36.52' N	145° 18.91' W	5.4	10	0.5	400	0.5	05/18/2004 22:48	05/18/2004 23:18
	58° 30.17' N	145° 15.30' W	6.6	10	0.7	3000	1.5	05/19/2004 00:00	05/19/2004 01:30
	58° 21.71' N	145° 15.18' W	8.5	10	0.8	3000	1.5	05/19/2004 02:18	05/19/2004 03:48
	58° 13.14' N	145° 15.26' W	8.6	10	0.9	3000	1.5	05/19/2004 04:42	05/19/2004 06:12
	58° 04.52' N	145° 15.37' W	8.6	10	0.9	3000	1.5	05/19/2004 07:06	05/19/2004 08:36
	57° 55.67' N	145° 15.47' W	8.9	10	0.9	3000	1.5	05/19/2004 09:30	05/19/2004 11:00
	57° 46.95' N	145° 15.41' W	8.7	10	0.9	3000	2.2	05/19/2004 11:54	05/19/2004 14:06
	57° 38.45' N	145° 15.26' W	8.5	10	0.9	3000	1.5	05/19/2004 15:00	05/19/2004 16:30
Gore Point Box	59° 14.05' N	152° 02.15' W	233.3	10	23.3	85	0.2	05/20/2004 15:48	05/20/2004 16:00
	59° 11.54' N	152° 04.79' W	2.9	10	0.3	100	0.3	05/20/2004 16:18	05/20/2004 16:36
	59° 09.03' N	152° 07.43' W	2.9	10	0.3	160	0.3	05/20/2004 16:54	05/20/2004 17:12
	59° 06.53' N	152° 10.08' W	2.8	10	0.3	160	0.3	05/20/2004 17:30	05/20/2004 17:48
	59° 04.02' N	152° 12.72' W	2.9	10	0.3	135	0.3	05/20/2004 18:06	05/20/2004 18:24
	59° 01.51' N	152° 15.36' W	2.9	10	0.3	115	0.3	05/20/2004 18:42	05/20/2004 19:00
	58° 59.00' N	152° 18.00' W	2.9	10	0.3	85	0.2	05/20/2004 19:18	05/20/2004 19:30
	58° 49.65' N	152° 20.45' W	9.4	10	0.9	125	0.3	05/20/2004 20:24	05/20/2004 20:42
	58° 47.26' N	152° 21.67' W	2.5	10	0.2	135	0.3	05/20/2004 20:54	05/20/2004 21:12
	58° 44.87' N	152° 22.89' W	2.5	10	0.2	120	0.3	05/20/2004 21:24	05/20/2004 21:42
	58° 42.49' N	152° 24.10' W	2.5	10	0.2	150	0.0	05/20/2004 21:54	05/20/2004 21:54
	58° 40.10' N	152° 25.32' W	2.5	10	0.2	85	0.2	05/20/2004 22:06	05/20/2004 22:18
	58° 24.90' N	151° 43.50' W	26.6	10	2.7	165	0.3	05/21/2004 01:00	05/21/2004 01:18

Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Trans (hrs)	Depth (m)	On Sta (hrs)	Arrive (Local) Date/Time	Depart Date/Time
	58° 25.71' N	151° 31.87' W	6.1	10	0.6	165	0.3	05/21/2004 01:54	05/21/2004 02:12
	58° 26.54' N	151° 20.24' W	6.1	10	0.6	130	0.3	05/21/2004 02:48	05/21/2004 03:06
	58° 27.35' N	151° 08.61' W	6.1	10	0.6	100	0.3	05/21/2004 03:42	05/21/2004 04:00
	58° 28.16' N	150° 56.98' W	6.1	10	0.6	75	0.2	05/21/2004 04:36	05/21/2004 04:48
	58° 28.96' N	150° 45.35' W	6.1	10	0.6	90	0.2	05/21/2004 05:24	05/21/2004 05:36
	58° 33.01' N	150° 46.88' W	4.1	10	0.4	180	0.3	05/21/2004 06:00	05/21/2004 06:18
	58° 37.07' N	150° 48.40' W	4.1	10	0.4	200	0.3	05/21/2004 06:42	05/21/2004 07:00
	58° 41.12' N	150° 49.93' W	4.1	10	0.4	190	0.3	05/21/2004 07:24	05/21/2004 07:42
	58° 45.18' N	150° 51.45' W	4.1	10	0.4	190	0.3	05/21/2004 08:06	05/21/2004 08:24
	58° 49.23' N	150° 52.98' W	4.1	10	0.4	150	0.0	05/21/2004 08:48	05/21/2004 08:48
	58° 53.28' N	150° 54.50' W	4.1	10	0.4	150	0.0	05/21/2004 09:12	05/21/2004 09:12
	58° 57.34' N	150° 56.03' W	4.1	10	0.4	170	0.3	05/21/2004 09:36	05/21/2004 09:54
	59° 01.39' N	150° 57.55' W	4.1	10	0.4	175	0.3	05/21/2004 10:18	05/21/2004 10:36
	59° 05.45' N	150° 59.08' W	4.1	10	0.4	70	0.2	05/21/2004 11:00	05/21/2004 11:12
	09.50' N	151° 00.60' W	4.1	10	0.4	90	0.2	05/21/2004 11:36	05/21/2004 11:48
Eastern Portlock Bank, Stevenson Trough	58° 30.07' N	150° 13.61' W	46.3	10	4.6	100	0.3	05/21/2004 16:24	05/21/2004 16:42
	58° 25.91' N	150° 15.26' W	4.2	10	0.4	75	0.2	05/21/2004 17:06	05/21/2004 17:18
	58° 21.75' N	150° 16.90' W	4.2	10	0.4	65	0.2	05/21/2004 17:42	05/21/2004 17:54
	58° 17.59' N	150° 18.54' W	4.2	10	0.4	55	0.2	05/21/2004 18:18	05/21/2004 18:30
	58° 13.43' N	150° 20.19' W	4.2	10	0.4	55	0.2	05/21/2004 18:54	05/21/2004 19:06
	58° 09.26' N	150° 21.83' W	4.3	10	0.4	85	0.2	05/21/2004 19:30	05/21/2004 19:42
	58° 05.10' N	150° 23.48' W	4.3	10	0.4	170	0.3	05/21/2004 20:06	05/21/2004 20:24
	58° 00.94' N	150° 25.12' W	4.2	10	0.4	200	0.3	05/21/2004 20:48	05/21/2004 21:06
	57° 56.78' N	150° 26.76' W	4.2	10	0.4	180	0.3	05/21/2004 21:30	05/21/2004 21:48
	57° 52.62' N	150° 28.41' W	4.3	10	0.4	160	0.3	05/21/2004 22:12	05/21/2004 22:30
	57° 48.45' N	150° 30.05' W	4.3	10	0.4	115	0.3	05/21/2004 22:54	05/21/2004 23:12
Chiniak Trough	57° 22.65' N	151° 43.00' W	46.8	10	4.7	70	0.2	05/22/2004 03:54	05/22/2004 04:06
	57° 24.86' N	151° 38.54' W	3.3	10	0.3	70	0.2	05/22/2004 04:24	05/22/2004 04:36
	57° 26.36' N	151° 35.44' W	2.2	10	0.2	135	0.3	05/22/2004 04:48	05/22/2004 05:06
	57° 28.01' N	151° 32.79' W	2.2	10	0.2	160	0.3	05/22/2004 05:18	05/22/2004 05:36
	57° 29.34' N	151° 30.55' W	1.8	10	0.2	145	0.3	05/22/2004 05:48	05/22/2004 06:06
	57° 30.63' N	151° 28.21' W	1.8	10	0.2	80	0.2	05/22/2004 06:18	05/22/2004 06:30
	57° 31.52' N	151° 26.66' W	1.2	10	0.1	70	0.2	05/22/2004 06:36	05/22/2004 06:48

Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Trans (hrs)	Depth (m)	On Sta (hrs)	Arrive (Local) Date/Time	Depart Date/Time
	57° 34.37' N	151° 21.22' W	4.1	10	0.4	70	0.2	05/22/2004 07:12	05/22/2004 07:24
	57° 36.05' N	151° 17.30' W	2.7	10	0.3	65	0.2	05/22/2004 07:42	05/22/2004 07:54
	39.78' N	151° 06.12' W	7.1	10	0.7	65	0.2	05/22/2004 08:36	05/22/2004 08:48
West Portlock Bank	57° 43.50' N	150° 54.95' W	7.0	10	0.7	100	0.3	05/22/2004 09:30	05/22/2004 09:48
	57° 48.13' N	150° 53.18' W	4.7	10	0.5	90	0.2	05/22/2004 10:18	05/22/2004 10:30
	57° 52.75' N	150° 51.42' W	4.7	10	0.5	90	0.2	05/22/2004 11:00	05/22/2004 11:12
	57° 57.38' N	150° 49.66' W	4.7	10	0.5	90	0.2	05/22/2004 11:42	05/22/2004 11:54
	58° 02.00' N	150° 47.90' W	4.7	10	0.5	135	0.3	05/22/2004 12:24	05/22/2004 12:42
	58° 06.63' N	150° 46.13' W	4.7	10	0.5	150	0.0	05/22/2004 13:12	05/22/2004 13:12
	58° 11.25' N	150° 44.37' W	4.7	10	0.5	150	0.0	05/22/2004 13:42	05/22/2004 13:42
	58° 15.88' N	150° 41.61' W	4.9	10	0.5	115	0.3	05/22/2004 14:12	05/22/2004 14:30
	58° 20.50' N	150° 40.85' W	4.6	10	0.5	75	0.2	05/22/2004 15:00	05/22/2004 15:12
	58° 25.13' N	150° 39.09' W	4.7	10	0.5	60	0.2	05/22/2004 15:42	05/22/2004 15:54
	58° 29.75' N	150° 37.32' W	4.7	10	0.5	75	0.2	05/22/2004 16:24	05/22/2004 16:36
	58° 34.38' N	150° 35.56' W	4.7	10	0.5	85	0.2	05/22/2004 17:06	05/22/2004 17:18
	58° 39.00' N	150° 33.80' W	4.7	10	0.5	175	0.3	05/22/2004 17:48	05/22/2004 18:06
Moorings	59° 02.53' N	148° 41.60' W	62.6	10	6.3	210	0.3	05/23/2004 00:24	05/23/2004 00:42
	59° 07.66' N	148° 45.65' W	5.5	10	0.6	170	0.3	05/23/2004 01:18	05/23/2004 01:36
	59° 17.02' N	148° 57.52' W	11.2	10	1.1	170	0.3	05/23/2004 02:42	05/23/2004 03:00
	59° 17.91' N	148° 57.80' W	0.9	10	0.1	170	1.0	05/23/2004 03:06	05/23/2004 04:06
	59° 32.02' N	149° 10.99' W	15.6	10	1.6	170	0.3	05/23/2004 05:42	05/23/2004 06:00
	59° 41.68' N	149° 19.90' W	10.7	10	1.1	210	0.3	05/23/2004 07:06	05/23/2004 07:24
Arrive Seward, AK	60° 10.00' N	149° 30.00' W	28.8	10	2.9	2.1	8.3	05/23/2004 10:18	

8.2.4 Cruise 1HX04 HAZMAT Inventory

Chemical	CAS Number	Respondee	Org.	Quantity	H	F	R	Storage Color Code	Hazard Class	Packing Group Number	UN	Reportable Quantity	Response Indices
Ethanol	64-17-5	Jorgensen	AFSC		3	4	2	Flammable	3	II	1170	5,000-LBS	1
Formaldehyde	mix	Jorgensen	AFSC		3	2	2	Flammable	3 & 8	III	1198	100-LBS	1
Sodium Borate	1330-43-4	Jorgensen	AFSC		2	0	0	General	Not regulated			None	2

Spill Response 1: Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e.g., vermiculite, dry sand, or earth), and place in a chemical waste container. Do not use combustible materials, such as sawdust. **Do not flush to sewer!** If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water, and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.

Spill Response 2: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.